

OUTDOOR RECREATION AND THE QUABBIN RESERVOIR: AN EXERCISE IN POLITICAL MANEUVERING?

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Abstract: The Quabbin Reservoir was built in the 1930's as a water supply for Boston. It is currently managed by the Metropolitan District Commission (MDC) as an unfiltered source of drinking water. In order to ensure that water quality remains high enough to avoid the installation of a multi-million dollar filtration plant, the MDC has limited public access to the reservoir and recreation use on its surrounding lands. As a result, the Quabbin is essentially undeveloped and wilderness-like in its current condition. As one of the largest bodies of freshwater in New England, the Quabbin has a recreational appeal not easily found elsewhere. Some activities, such as hiking, picnicking, birdwatching and shore and boat fishing are allowed. However, other user groups would like to recreate at the Quabbin, but cannot because of use restrictions. For example, swimming, off-road bicycling, canoeing, sailing and cross-country skiing are all prohibited. On the surface, the recreation policies of the MDC are puzzling and seemingly incongruent. For example, motor boats are allowed on the reservoir, even though the engines and users could contaminate the water, but sailboats and canoes are not. Hunters are allowed on an area known as Prescott Peninsula, but hikers are not. Logging operations using heavy equipment are conducted as part of watershed management, but camping is prohibited. The purpose of this paper is to examine the history of recreation at the Quabbin Reservoir. Particular attention will be paid to the science and politics

behind various management decisions. It will also examine the types of use sought and by whom and the potential for the Quabbin to accommodate such uses.

Introduction

Massachusetts is the third most densely populated state in the union. Yet, in the western part of the state there exists the largest tract of open space in Southern New England (MDC, 1996). This is the Quabbin Reservation. The Quabbin Reservation consists of 81,000 acres of undeveloped, forested watershed land and an 18-mile long reservoir with a surface area of 25,000 acres and 118 miles of shoreline. Within the reservoir are heavily forested islands and a 12,000-acre peninsula. The water of the reservoir is blue-gray and generally calm, yet there are days when strong breezes bring waves. Most visitors to the reservoir have at least one sighting of a wild animal such as a turkey, deer, coyote, songbird, loon or bald eagle.

This idyllic setting sounds like a haven for outdoor recreation enthusiasts. However, recreational opportunities are severely limited by the Metropolitan District Commission (MDC), the agency responsible for managing the reservoir. The MDC argues that too many visitors would compromise the true purpose of the reservoir - providing drinking water to over 2.5 million residents of Boston and surrounding towns. Too many visitors could jeopardize water quality directly, by contaminating the water, and indirectly by negatively impacting the forest in the watershed.

Due to the type of forest surrounding the reservoir, the water entering the reservoir and being sent to customers does not need to be filtered. Therefore, it is categorized as Class A water. The MDC wants the reservoir to remain unfiltered because the installation of a filtration facility would be a very costly prospect. In order to ensure a healthy watershed, and as a result an unfiltered source of water, the MDC strives to minimize human activity within the reservation. As a result, the Quabbin is essentially undeveloped and remains in a seemingly "natural state."

However, as one of the largest bodies of freshwater in New England, the Quabbin has a recreational appeal not easily found elsewhere. The managers

of the Quabbin recognize this and allow certain activities including hiking, picnicking, fishing, and bird watching in many areas of the reservation. However, many others would like to recreate at the Quabbin, but cannot because of use restrictions. Activities such as swimming, camping, cross-country skiing and ice fishing are prohibited. Furthermore, some of the policies of the MDC are seemingly incongruent. For example, motorboats are allowed on parts of the reservoir, but sailboats are not. Hunters are allowed on an area known as Prescott Peninsula, but hikers are not. Logging operations using heavy equipment are conducted as part of watershed management, but off-road bicycling is prohibited.

The purpose of this paper is to examine the history of recreation at the Quabbin Reservoir. Particular attention will be paid to both the science and to the politics behind various management decisions. It will also examine the types of use sought and by whom and the potential for the Quabbin to accommodate such uses.

Current Recreation Policy

The Quabbling Reservoir was built in the 1930's to supply the ever-increasing population of Boston with clean drinking water. Its main function is to supply drinking water to 2.5 million customers. The primary goals of the MDC are to protect water quality and quantity. The Swift River Act, passed in 1927, is the legislation that appropriated money for the construction of the reservoir. This 19-page act discusses almost every aspect of the establishment and running of the reservoir, except recreation. Thus, it has been left up to the MDC to develop and implement a recreation policy.

It wasn't until 1972 that the MDC Quabbin's recreation policy was codified. This legislation, known as the Kelly-Wetmore Act, made official the policies the MDC had been following for years. It disallows development of land in the reservation, hunting, and camping, as well as sets forth the rules for logging operations and allows for public access to reservation land with the exception of Prescott peninsula.

Seventeen years later the Quabbin Recreation and Public Access Policy and Plan took effect. This plan calls for limiting or minimizing new recreational activities or increased intensity of

existing access or activities in the public water supply watershed (MDC, 1998) of which Quabbin reservation is a part. It also allows for a controlled deer hunt and clarifies which recreational activities are allowed within the reservation. Currently, the following activities are allowed, with limitations, at the Quabbin reservation:

Bicycling = but only on paved roads so as to prevent soil erosion and to limit access to shorelines.

Sledding = allowed down hills in areas other than the reservoir, Prescott Peninsula, reservoir islands, the dam or the dike so as to protect these structures and because of the potential for injury due to the steep slope of the dam.

Hiking, walking, and snow shoeing = allowed in designated areas and/or during designated times because the MDC must limit access to sensitive areas to protect the drinking water quality from contamination by improperly disposed of sanitary wastes.

Shore fishing = allowed on approximately 50% of the shoreline, by foot during regular fishing season. This is allowed due to early legislation. The MDC feels that by limiting the access areas, it limits potential negative impacts to the water quality.

Boat fishing = allowed only with a valid Massachusetts fishing license or a one-day, five-dollar Quabbin license, on three-quarters of the west branch of the reservoir, and more than two-thirds of the middle branch of the reservoir. Boats are restricted to the area north of the intake valves which draw the water from the reservoir to be sent to consumers. Furthermore, the horsepower of the motors is limited to 20 hp for a two-stroke engine and 25 hp for a four-stroke engine. By limiting motor size, the MDC limits the potential for pollution from this source.

Kayaking and canoeing = allowed, but not on the main part of the reservoir. Only on a small pond that branches off from the reservoir. This is due to concern over human safety, increased usage and potential harm to water quality. It is only recently that kayakers and canoers have been given access to the Quabbin.

Night access = allowed for fishing purposes, with a night access permit.

Assemblies = gatherings of more than 25 people need to apply for a permit. When requested,

permits are usually granted to groups. For example, many people hold their wedding ceremonies at the Quabbin. This is allowed as long as cars are parked so as to avoid blocking the flow of traffic and nothing is put up that will be driven into the ground or a tree. Also, schools, scout troops, and camps, often apply for and receive permits for groups of 25 or more to hike into various gates for educational purposes.

Activities prohibited at the Quabbin reservation are:

Off-road motorized vehicles = cause excessive erosion and can leak fuels or other hazardous materials onto watershed land, which can end up in the public water supply.

Snowmobiles = again, this is due to the potential introduction of fuel and other harmful chemicals as well as a potential impact to the natural character of the area.

Cross-country Skiing = not allowed within the reservation due to the threat of illegal access onto the frozen reservoir and to protect public health and safety. MDC feels that cross-country skiing could potentially conflict with providing clean and abundant water to the public.

Hunting and trapping = with the exception of the annual controlled deer hunt.

Ice fishing & ice skating on the reservoir = due to concerns over sanitary and safety issues. Ice fishing is allowed on three small ponds that are within the reservation, but not connected to the reservoir. These ponds are shallow and their water does not flow into the Quabbin reservoir.

Fires & cooking = due to risk of forest fire. “. . . the majority of forest fires in the Quabbin Reservoir Watershed System have been started by camping fires” (MDC, 1998).

Sail boating and windsurfing = due to “potential public health, safety, and logistical problems” (MDC, 1998). Specifically, MDC personnel are worried about the impact on human health if human waste enters the reservoir. Safety concerns center around the ease at which these objects tip over. This is because the temperature in the main body of the reservoir is “fairly cold” year round (personal communication). Logistical problems stem from the fact that the MDC Quabbin does not have enough man power to patrol the entire reservoir and come to the aid of people stranded in the water in a

timely manner.

Swimming = because swimming in the reservoir or any of its tributaries increases the potential for contamination by pathogens, such as *Cryptosporidium* and *Giardia*.

Consumption of alcohol = due to the increased potential for those under the influence to disregard MDC's rules and regulations.

Organized sports = due to the potential for increased recreation in the Quabbin watershed.

Domestic animals = due to the potential for the introduction of *Cryptosporidium* and/or *Giardia*. Dogs, cats and cattle are carriers of these organisms. So are beaver, muskrats, and gulls. The MDC takes measures to control the occurrence of these animals near the intake valves. Other wild animals, such as deer and moose have not been found to be carriers of these organisms, although they can certainly pick them up from contact with infected feces of a carrier animal. Furthermore, dogs are a concern because they harass wildlife and other visitors.

Collecting and metal detecting = to protect historic and pre-colonial sites.

Camping, this includes tents, trailers, lean-to's, and motor homes = due to public health and safety concerns. Camping increases sanitation problems, fire issues and the number of users. Furthermore, it “would divert water management resources to conduct recreational management activities” (MDC, 1998).

Fishing derbies = due to the potential increase in visitor numbers.

Target shooting = “to preserve the apparent natural character in the system” (MDC, 1998).

Participants in various types of recreation want very much to gain increased access to the reservation. Specifically, sailboaters, canoers and kayakers want to be allowed on the main part of the reservoir. Hikers would love to have access to Prescott Peninsula. Mountain bikers and swimmers want to be able to recreate at the Quabbin. The dissatisfaction of these groups is expressed in phone calls and letters to the MDC Quabbin staff.

Potential Risks Due To Recreation

Nonetheless, there are some important data upon which the MDC bases its decision to limit recreational access. Surface water supplies are subject to much contamination. Any use of a reservoir or its surrounding watershed has the

potential to pollute the water. Recreation, however, is of particular concern when striving to maintain public health. Recent research, undertaken by various water resource authorities, has confirmed that recreation is a potential source of non-point pollution (AWWA, 1995; AWWARE, 1991 in MDC, 1998). In 1991, Rizzo Associates assessed all possible sources of water pollution for the Quabbin Reservoir and found recreational impacts to be a high public health risk (MDC, 1998). This is due to the “relatively high risk [of] introducing viral, bacterial, and parasitic pathogens into the water supply from human activity and the presence of domestic animals” (MDC, 1998). Furthermore, additional negative impacts from recreation include: shoreline erosion, fuel spills, destruction of vegetation, fires, trash, vandalism, and dumping of hazardous materials (MDC, 1998).

The main reason the MDC strives to limit public access is due to the potential human health threat from the *Giardia* and *Cryptosporidium* parasites. Both are very real threats to unfiltered, chlorinated surface water supplies such as the Quabbin reservoir (MDC, 2000). These pathogens are most often associated with human and animal waste. They can enter the water supply directly from improperly disposed of human or domestic animal waste or by infecting native wildlife which then swims in the reservoir and directly deposits the parasite into the water. If ingested by people, *Giardia* or *Cryptosporidium* can cause prolonged fever and diarrhea and can lead to death in those with a weakened immune system.

It is especially important for the MDC to prevent the introduction of these microbes into the water supply because above a rather low threshold of contamination, the water is made drinkable only by filtration (MDC, 2000). The threshold level is established by the Environmental Protection Agency (EPA). Furthermore, EPA's Surface Water Treatment Rule (SWTR) recommends that an aggressive watershed control program be implemented to effectively eliminate or limit contamination by these human enteric pathogens (MDC, 2000). The MDC chooses to err on the side of caution and limits, as much as possible, the activities they feel have the most potential to negatively impact water quality.

Thus, although it may seem that the MDC

implements recreation policies at will, there are in fact many guidelines they must follow and health risks they must consider. First and foremost, the MDC manages their lands and waters for “water quality protection, ecological reasons . . . administrative and maintenance purposes” (MDC, 1989). The MDC cannot allow uncontrolled access to the reservation as this increases the risk of disease causing biological borne agents contaminating the water supply. The MDC is tightly regulated by the EPA and must take stringent measures to protect the water quality so as to avoid having to install a \$180-million dollar filtration system (Press Release for Civil Action No. 98-10267-RGS, 2000).

Public Input

In forming public recreation policies, the MDC also tries to respond to the desires of various stakeholder groups by holding public meetings and involving the Friends of Quabbin, the Quabbin Watershed Advisory Committee (QWAC), the Water Supply Citizens Advisory Committee (WSCAC), the Sportsman Council, and the general public in the decision making process. There were two public meetings, and many advisory committee meetings held before the 1988 “Public Access and Recreation Policy and Plan” was revamped in 1998. The MDC's goal was to “solicit input from the local public regarding public access and recreation management issues in the Quabbin Reservoir Watershed System” (MDC, 1998).

In order to reach the greatest number of people before the public meetings, the MDC mailed copies of the draft of the 1998 plan, a press release, and a public hearing notice to watershed communities' Select boards and public libraries. Also, a press release was published in two papers and the advisory committees, state representatives, state environmental agencies, and environmental groups were notified. According to the MDC, the information garnered at the meetings was “incorporated into several of MDC's public access policies” (MDC, 1998).

Influence of Recreational Interests

Sometimes, MDC decision makers are swayed by various interest groups and allow certain recreation activities which they had previously not allowed. Demands of various stakeholder groups have

certainly influenced MDC's policies in the past. The first such example is the fishing program. Shore fishing was first allowed at the Quabbin in 1946 due to pressure from the fisherman's lobby (MDC, 1996). Furthermore, the Quabbin boat-fishing program began in 1952. The MDC objected to the program and expressed concern over the increased potential for harmful effects to the water quality. However, the Governor, responding to public pressure for fishing, introduced legislation making it legal to fish from a boat on the Quabbin reservoir. Since the start of the fishing program, the number of participants increased and peaked at 65,725 anglers in 1975 (MDC, 1998).

At present, there are three boat launch areas with between 30 - 50 rental boats per area and about 17 motors per area. The MDC limits boat fishing through rules and regulations, which include size limits on boats and motors, prohibited areas, and a relatively short season. The hope is that these limitations will minimize harmful effects to water quality.

Night fishing is another example of access gained against MDC's initial policy, due to pressure from a stakeholder group. Night access permits were first granted to fishermen in 1988. To this day the MDC still has concerns about trash, fires, vandalism and alcohol use, although none of these concerns have been realized.

Another example of the MDC accommodating stakeholders is in allowing canoes and kayaks on Pottapaug Pond. Granted, they are not allowed on the main body of the reservoir, but are now allowed on a small pond attached to the reservoir. This policy first came into being in 1998 at the request of the Quabbin Watershed Advisory Committee. The MDC limits canoeing and kayaking by establishing a minimum boat size, restricting access on the main reservoir, having a relatively short season and requiring that a canoeer or kayaker have a Massachusetts state fishing license or a one-day five dollar Quabbin license.

The MDC Quabbin's environmental quality lab tests the water from the reservoir every day of the year. To date, no negative effects have been noted on the quality of Quabbin's water, or its watershed, as a result of the fishing program, the night access

program, or the increased access to Pottapaug Pond (personal communication). This leads one to believe that the MDC's recreation policies had been, and still may be, unnecessarily restrictive.

Management Derived Policies

The implementation of a Quabbin controlled deer hunt is another important example of the MDC modifying a previous access policy. While the hunt was instituted due to concern over water quality and not due to outside demands, it is important to recognize this change in policy and the minimal effect it has had upon the quality of Quabbin's water. For more than 50 years the MDC did not allow hunting at the Quabbin due to concerns about the negative impact on water quality from the increase in public access. The concerns stemmed from the idea that hunters could potentially increase soil erosion, decrease water quality by not following proper sanitary requirements, disobey MDC rules and regulations and behave in an unruly fashion.

However, by the late 80's after many decades without any form of population control, the deer herd inside the Quabbin reservation had grown so numerous it was endangering the water quality of the reservoir. The deer were overbrowsing the forest surrounding the reservoir leading to potential soil erosion, nutrient loading and eutrophication. The MDC concluded that in order to allow the forest to regenerate, the deer population had to be reduced and then maintained at a lower density. After consideration of various herd reduction methods, a controlled hunt was chosen as the most practical and fiscally responsible option.

It was practical because it would allow the MDC to closely monitor and minimize the impacts of the hunters' activities. Hunters could be required to attend an orientation session, told when and where they could hunt, and how many deer of each sex they could take. It was fiscally responsible because it would be the lowest cost option in the long run. Furthermore, hunters would be required to purchase a Quabbin hunting permit. Some of the revenue from this fee would be used to fund measures which prevent degradation of the watershed such as gates to prevent non-essential vehicular access, the planting of seedlings, fire suppression equipment and pollution control materials (MDC, 1989).

Another policy that seems incongruent with the MDC's rules and regulations is that of logging in the forest surrounding the reservoir. Logging uses heavy equipment that tears up the ground and potentially leads to soil erosion. Nonetheless, in order to maintain the diversity in tree species and age, which is necessary for a healthy forest and to protect water quality, trees must be selectively harvested. As part of forest management, the MDC allows selective cutting of trees to "increase quality water yields, maintain healthy, diverse forest and wildlife communities, and improve the scenic qualities of these watersheds" (MDC, 1989). The MDC closely monitors forestry operations and limits access by individually selecting and marking trees for harvest, contracting jobs out to private logging companies, making sure logging operations are supervised by a forester, and not allowing any trees to be cut within one hundred feet of any river or stream leading to the reservoir. Furthermore, in order to minimize potential damage from heavy equipment, the placement and layout of landings are carefully planned and dependent upon soils that will bear the equipment (MDC, 1995). Also, skid roads are carefully laid out with grade and distance kept to a minimum. "Skidder width and weight requirements are tailored to site conditions. Skidding is stopped when rains or thaws make the soils unable to support skidders" (MDC, 1995). Based on the close monitoring of the logging operations and the need for such operations to maintain a healthy forest, the detrimental effects of logging have not outweighed any benefits (personal communication).

Hunting and logging are management sanctioned activities that occur at the Quabbin. They have both been deemed necessary to aid in the protection of water quality. As previously mentioned, the quality of the reservoir's water is tested every day. To date, there have been no negative impacts on the quality of Quabbin's water, or its watershed, due to the controlled deer hunt or logging operations. Instead, the forest surrounding the reservoir is healthy, diverse, and composed of many age classes of trees. This demonstrates that with careful planning, seemingly harmful activities can occur at the Quabbin without harmful results.

Recreational Carrying Capacity of the Quabbin

The apparent willingness of the MDC to lessen certain recreation restrictions leads to the questions of what other recreation opportunities the public would like to enjoy at the Quabbin and how many of these can be allowed without affecting water quality. Currently there are many stakeholders that would like to see the Quabbin open to more recreation, including canoers and kayakers who want access to the main part of the reservoir, sail boaters, hikers who want access to Prescott Peninsula, campers, off-road bicyclists, and cross-country skiers who want access to the reservation.

Reluctance of the MDC to open the reservation up more may be due to a policy instituted by the American Water Works Association in 1965. This policy states that recreation on Class A reservoirs, of which the Quabbin is one, should be prohibited. Class A is a category which consists of watersheds that are "uninhabited or sparsely inhabited and for which no treatment other than disinfection is required" (Klar et al., 1983). However, there seems to be little direct evidence of the effects of recreation on the water quality of a reservoir like the Quabbin. "Quabbin and other drinking water reservoirs may be best maintained as minimal or single use resources but the rationale for doing so has not been developed with any degree of clarity or certainty" (Klar et al., 1983). Lawrence Klar et al. addressed this issue twenty years ago in a study, which quantitatively assessed the capacity of the Quabbin reservoir "to accept certain levels of human activity without impairing water quality and without incurring extra costs" (Klar et al., 1983). Klar et al. used surveys and mathematical models to determine the demand for additional recreation activities at the Quabbin, the carrying capacity of the Quabbin Reservation for these additional activities, and the financial costs associated with providing these additional activities. In addition to a willingness to pay for activities already provided (by 36.9% of respondents) such as hiking, picnicking, and fishing, Klar found much demand for canoeing, sailing, swimming, and camping (approximately 44% of respondents). A minority of respondents (24.3%) indicated a willingness to pay for ice fishing, snowshoeing, and cross-country skiing. When asked about recreational motorboating and waterskiing, however, willingness to pay declined.

Thus, at the time of the study, much demand did exist for permitted recreational activities as well as for canoeing, sailing, swimming, and camping.

The question remained as to the impacts these additional activities would have on the Quabbin ecosystem and the quality of its water. Using the activities for which a demand existed, Klar determined the pollutant loading rate of each one. These rates were plugged into a hydraulic model of the Quabbin Reservoir to determine the dispersal path of pollutants.

The potential impacts to the land and the amount of acceptable contamination varied by activity. Fishing from boats with outboard motors has been allowed at the Quabbin for many years. Today, there is negligible damage to the land from this activity as boat launches have been built. For pollution from this type of boating Klar et al. used existing literature. They found that pollution from outboard motors had been linked with a rather short-lived increase in turbidity levels. They also found reports of microbial contamination due to boating. They did not, however, include this in the model, as it was “obviously a result of discharge from onboard toilets” (Klar et al., 1983). Rather, Klar et al. assumed that these types of boats would always be prohibited on the Quabbin. Thus, the boat fishing program has had minimal impact on the land and water of the Quabbin reservoir.

In looking at the potential of the Quabbin to accommodate sailing, swimming, and camping, the most important measurements were of the amounts of soil and nutrients that could reach the water. “Nutrients contained in waste water generated from recreational activities pose the single largest threat to water quality” (Klar et al., 1983). Wear and resulting runoff and soil erosion result from trail use and campsites. Klar et al. noted that careful planning and mulching could control this. Using the Universal Soil Loss Equation they were able to calculate the maximum amounts of soil and nutrients that could reach the water without negatively impacting the quality of the Quabbin’s water. Then, they were able to determine the increased amount of recreation that could occur without harming the water quality.

After determining the level at which recreation would not harm the quality of the water, Klar et

al., performed a benefit cost analysis. Included in the costs were the cost of collection and removal of human waste from the reservation, the cost of expanding the parking and launching facilities at the boat launch areas, the cost of developing a beach-like shoreline for swimmers, and the cost of developing campsites and roads. Economic benefits were obtained from the cost per vehicle, which would depend on the activity in which the occupants were to participate. Camping fees would be \$14 and \$10 for hiking, picnicking, fishing, canoeing, sailing and/or swimming.

Assuming a low-density rate of recreation, it was estimated that per design day, 450 people would camp and 3,300 would participate in the other activities. The total net revenue would be \$7,500. A low-density rate of recreation was used even though it did not attain the economic optimum. It was, however, “found to be a feasible level of activity given the resources and constraints considered” (Klar et al., 1983).

Also, given the resources and constraints, Klar et al. (1983) pointed out that the various recreation activities should be dispersed among various areas of the reservoir. This would serve to avoid excessive wear in one area and to reduce or eliminate prospective conflicts among different groups of recreationists. The distribution of activities proposed in this study was: shore fishing along the west and north shores, boat fishing on the west branch and northernmost part of the middle branch, hiking along the southeastern and eastern section, and canoeing and sailing in a section of the east branch, and camping on 64 acres below the eastern branch.

Klar et al. performed a thorough study that looked at all aspects of increasing recreation at the Quabbin. The results of the study indicated that additional recreational activities, including swimming, sailing, and camping could be accommodated at the Quabbin without harming the water quality. However, the activities would have to be carefully zoned and some activities which are currently allowed, such as fishing and hiking, would be zoned to smaller areas than presently exist.

Discussion

The conclusions drawn in the 1983 study

indicated that demand for recreation at the Quabbin reservation far exceeded supply and that additional recreational activities could be accommodated without harming water quality. If this were true twenty years ago, it is most likely still true today. Travel costs have only increased, thus people are still looking for recreation opportunities close to home. Plus, technology has improved. Therefore, it seems likely that additional recreational activities could still be accommodated without harming water quality.

Nonetheless, in the 20 years since the study was published, very few limitations to recreation have been lifted by the MDC. The only new activities permitted in recent years are night fishing, canoeing and kayaking and only with restrictions. Night anglers must apply for a permit and pay a three dollar fee. Canoers and kayakers must have a fishing license, even if they are not fishing, and they are restricted to the 1.5 mile long Pottapaug Pond. This is hardly the great boating opportunity enthusiasts of these forms of recreation desire.

The reasoning behind the MDC's desire to severely limit recreation is open to conjecture, as no one from the agency has openly stated the thought process behind the policies. One cannot argue with the scientific data or EPA requirements limiting certain contaminants so as to protect human health. Nor can one argue with the limitations imposed to ensure human safety. However, questions remain as to whether or not the EPA imposed limits would be exceeded and human safety would be jeopardized, if recreational activities were to be increased at the Quabbin. Furthermore, one can't help but wonder why the MDC remains opposed to allowing more forms of recreation at the Quabbin reservation.

It is, inarguably, easier on the managing agency to maintain the status quo than to implement new policies. In addition to dealing with opposition from various stakeholders, they would have to institute new procedures and maybe even staff changes. One potential source of opposition to the changes proposed by Klar et al. is from those who currently fish at the Quabbin, both from boats and from the shore. The recreation plan proposed by Klar et al. severely limits access for both shore and boat fishing. Currently boat fishing is allowed on about two-thirds of the reservoir. In Klar et al.'s

plan, boat fishing is limited to approximately one-quarter of the reservoir. Furthermore, shore fishing is currently allowed from about three-quarters of the shoreline of the reservoir. The proposed recreation plan limits shore fishing to less than one-quarter of the reservoir's shoreline. Similarly, hiking, which is currently allowed within most of the reservation, would be limited to about one-fifth of the area around the reservoir. Thus, opposition could also come from hikers.

Another source of potential resistance is the consumers, or those who buy their drinking water from the Quabbin reservoir. Aukerman et al. (1977) pointed out "other water users, whether they be public or private, must be convinced that the amount and time of delivery of their water will not be affected, and that they will have something to gain from recreational use of 'their' water (Klar et al., 1983). It seems that it would be a difficult task to convince residents of the Boston area that they should allow more recreation to occur on the reservoir from which their water is drawn. Most consumers are about a two hour drive away from the reservoir and it is unlikely they will recreate there as often as people that live closer to the reservoir, but do not get their drinking water from it.

Surely, another part of the hesitancy of the MDC is the idea of losing control. That is, if they give an inch, would they eventually be forced to give a mile? If they give a mile, how long would it be before they exceeded the EPA imposed limits for microbial counts and are forced to install the \$180 million dollar filtration plant? Clearly, it is easier for the MDC to not allow any more recreation than to deal with such issues.

Another possibility is that the MDC does not want to open the reservation to more recreation because if they did, they would have to charge an entrance fee (to cover the costs of expanding recreation facilities). An entrance fee could be a hardship on lower income individuals and families thereby preventing them from recreating at the Quabbin. Perhaps, this hardship is a concern of the MDC.

Finally, it is possible that MDC Quabbin employees are basing their recreation policies on their values. That is, they could hold biocentric values for the area as opposed to anthropocentric. Thus, they would want to limit human access so as

to allow the wildlife and entire ecosystem to exist in as natural a manner as possible.

Conclusion

The huge expanse of open land surrounding the Quabbin reservoir is unlike anything else found in all of southern New England. With costs and concerns about travel rising, it seems that demand for recreational opportunities closer to home will only increase. The Metropolitan District Commission must be prepared to deal with this demand.

So far, the MDC has placed severe limits on recreation by relying on the EPA's stringent level of water quality control. It is certainly true that first and foremost the Quabbin reservoir is a drinking water supply for over 2.5 million people. Thus, there do need to be controls in place to ensure the health of those who drink the water of the Quabbin. Furthermore, the safety of those who utilize the Quabbin to recreate needs to be maintained. Still, throughout the history of the Quabbin, in small increments, it seems that more recreation is being allowed. First, shore fishing was allowed, then boat fishing, then night access, then a controlled hunt was implemented, and most recently canoers and kayakers gained access to a small part of the reservoir. When first proposed, all of these activities raised red flags in the minds of the MDC- Quabbin staff as to how to allow each activity and still maintain the high quality of the water. Yet, the MDC has proven that it can maintain enough control over these activities to allow them to continue without harmful effects upon the quality of the water.

Unfortunately, there are no recent studies and little direct evidence about the potential impact of increased recreation upon the Quabbin. Klar et al. performed a survey and used mathematical models to develop a recreation plan for the Quabbin. The plan allowed current activities for such as hiking, picnicking, and fishing, to continue as well as for new activities to be allowed such as canoeing, kayaking, swimming, camping, and sailing. During the 20 years since this plan was developed there has been little change in the recreation policies of the MDC, with the exception of the allowance of canoeing and kayaking on a small part of the reservoir.

It seems that the MDC would rather keep new

forms of recreation at bay. EPA mandated quality levels are used as a reason for not allowing more recreation. Nonetheless, when enough pressure is exerted, they do bend. This suggests that the recreation policies at the Quabbin reservation are more stringent than necessary. Instead, it seems that it is possible to incrementally open the Quabbin reservation up for more recreation while remaining vigilant that such an increase does not cause water quality to deteriorate below EPA set standards. The MDC could collect data and figure out exactly what level of demand exists for various recreational opportunities at the Quabbin and what level and types of recreational opportunities could be allowed without negatively impacting the quality of the water.

A survey of various stakeholder groups should be prepared to see what current sentiment is regarding the Quabbin reservoir. The last time such a study was undertaken was twenty years ago. Perhaps opinions have changed since that time. Furthermore, although the goal of the 1983 study was to "optimize recreational use of the Quabbin Reservoir from social, economic, and technical viewpoints" (Klar et al., 1983), the survey was admittedly lacking in one important aspect. The authors of the 1983 study discuss the fact that they did not measure the value of preserving the wilderness aspect of the area. Thus, any future study done on stakeholder groups' attitudes and opinions about recreation at the Quabbin should include non-use values as well as use values. Furthermore, the impacts of various recreation activities, in light of more modern technological advances should be examined. The results of such a survey and study would best allow the MDC to deal with current and increased demand for recreation at the Quabbin Reservation.

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